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HISTORICAL BACKGROUND OF ENERGY POLICY: FEDERAL RESPONSE TO THE ENERGY PROBLEM[1]

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THE EMBARGO

Most Americans regard the oil embargo of 1973 as the beginning of our energy problems. This attitude has been conveyed by references to that embargo as a second Pearl Harbor. In fact there had been previous oil interruptions. In 1956 the Egyptian-Israeli conflict closed the Suez Canal blocking the shipment of Middle Eastern oil to Western Europe, and during the Six-Day War in 1967 the Arab countries shut down their wells. But in both of these cases the high production levels of the United States helped alleviate the shortage. By 1973, however, we had become dependent on foreign oil and, therefore, vulnerable to its use as a political weapon.

There were several factors which contributed to this vulnerability. The expansion of the economy in the United States during the two decades prior to 1970 was accompanied by a steep rise in energy consumption. Along with this unprecedented increase in energy demand, there was a major shift to dependency on oil. Coal was virtually abandoned by electric utilities and industry as oil was plentiful and less expensive, and as justifiable concern over air pollution increased.

As a result of this voracious appetite for oil, new domestic finds could not keep up with consumption. In the later 1960's, additions to proved domestic reserves of both oil and gas fell behind the rate of production, which peaked in 1970.

In previous years, in anticipation of this, U. S. oil companies had developed highly productive oil fields in foreign countries. Many of these fields were in former European colonies located in the Middle East. In time, these newly independent countries took control of this oil by nationalizing these holdings. Because oil production in these countries was (and is) far less costly than domestic production, imports were the most economical means of supplementing domestic production to meet our demands. Thus, in the early 1950's, the United States began a trend of increased consumption of foreign oil that would ultimately become a dependency.

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[1]This discussion of recent energy history was prepared for the Energy Policy Task Force of the Energy Preparedness Subcommittee of the Virginia Coal and Energy Commission. The author wishes to thank the Task Force members: Philip Abraham, Dr. Temple Bayliss, Dr. Robert C. Milici, and Dr. Donald Shull for their assistance in the preparation of this work.

Alarmed that increasing dependence on foreign oil would pose a threat to national security, Congress, in 1955, gave the President the power to restrict imports. After requests for voluntary limitations failed, President Eisenhower imposed mandatory quotas in 1959. The quota system was controversial, with the New England states being especially critical as they argued that their region's energy bills were much higher because of the quotas. National consumer groups also pointed to the quota system as the cause of rising energy costs. President Nixon's advisors recommended an end to the quotas and in deference to this, the quotas were relaxed. Demand exceeded equilibrium supply slightly during the harsh winter of '72-'73, and the price of home heating oil rose. However, price increases which would have caused increased production were eliminated by overall price ceilings which had been imposed by the President in August 1971. These price controls on oil were continued to some degree, despite the efforts of three administrations, until oil prices were fully decontrolled under President Reagan.

Another opportunity to decrease our dependency on foreign oil was through the use of oil from Alaska's North Slope. A consortium of oil companies had championed the building of the Trans-Alaska Pipeline, but in 1970 the Interior secretary was forbidden to issue the permits as a result of a court order won by environmental groups.

As the Nation entered the fall of 1973, it was dependent upon foreign sources for 36 percent of its oil and half of that oil was from countries which belonged to a cartel known as the Organization of Petroleum Exporting Countries (OPEC). This cartel began in 1960 and expanded its membership throughout that decade. Many of its members are Arab states who have been hostile to U.S. interests in the Middle East.

When the Yom Kippur War began in 1973, these Arab states first threatened and then followed through with an embargo of oil shipments to the United States. Despite concern for dependency on imports, the Nation had not found an alternative. In fact, domestic production had been discouraged by price controls. Construction of the Alaskan Pipeline had been blocked as a result of environmental concerns. The Clean Air Act of 1970 had contributed to the displacement of coal by oil. In early 1973, oil prices in the United States were actually lower than they had been at any time during the preceding two decades, allowing for inflation.

Heightening our vulnerability due to dependency on imports, U.S. citizens consumed approximately twice the energy of their counterparts in European countries with similar standards of living. This was the result of years of cheap, abundant energy. Artificially cheap gasoline meant that Americans had not been compelled to consider energy efficiency in choosing their automobiles. Energy costs were not a significant factor in the design of buildings. We had evolved lifestyles which seemed to presume an infinite supply of inexpensive energy. "Use more and pay less" seemed to be the guideline for pricing energy.

The embargo was a powerful psychological blow to the United States. Citizens were not prepared for long lines at gasoline pumps. Filling stations displaying signs stating "no gas today" was a situation which the American consumer had never imagined. Emotions ran high and everyone had opinions on who was to blame and how to solve the problem.

IMMEDIATE RESPONSE AT THE FEDERAL LEVEL

Within three weeks of the imposition of the oil embargo on October 18, 1973, Congress had two bills ready for the President's signature. One of these authorized construction of the Trans-Alaska Pipeline, thereby overriding the challenges of environmentalists to this project. The other was the Emergency Petroleum Allocation Act, which required the President to set up, within 30 days, a comprehensive system for allocating petroleum products and to set prices of crude oil and refined products. The final version of this act stated that shortages of oil, caused by inadequate domestic production, environmental constraints, and insufficient imports would create severe economic hardships constituting a national energy crisis. The intent of this bill was to ensure equitable distribution of available fuel.

Both of these bills were already in the final stages of the legislative process when the embargo was imposed. The Nixon administration had backed the authorization

of the pipeline but had opposed the mandatory allocation system. Under the circumstances, the President signed both.

Two additional laws were passed in 1973 in response to the crisis. One act imposed daylight saving time on the Nation through the winter of '73-'74. The other law used the leverage of federal highway funds to persuade states to lower their speed limits to 55 miles per hour for all vehicles. These were the first federally mandated energy conservation measures.

In a televised address on November 7, 1973 (two weeks after the embargo), President Nixon announced "Project Independence" and stated the themes which came to dominate national energy policy throughout the mid '70's. He said, "In the short run this course means that we must use less energy...In the long run it means that we must develop new sources of energy which will give us the capacity to meet our needs without relying on any foreign nation." Nixon asked for a number of measures in addition to the Alaska Pipeline, i.e. lowered speed limits and legislation to give him allocation and pricing authority. Among his proposals were: authorization to order plants to switch to coal, diversion of funds from highway construction to development of mass transit, decontrol of new natural gas, expedition of licensing of nuclear power plants, creation of a Department of Energy, and funding of a $10 billion research and development program designed to achieve energy self-sufficiency by 1980.

In 1974 Congress created the Federal Energy Administration (FEA) and the Energy Research and Development Administration (ERDA). All federal energy research was consolidated under ERDA and the regulatory functions of the old Atomic Energy Commission were assumed under the new Nuclear Regulatory Commission (NRC). Congress authorized a $20 billion investment in non-nuclear research and development. Loan guarantees were provided for the development of electricity from geothermal energy and the Solar Energy Research Institute (SERI) was established. Funding of $75 million was authorized for solar research and to demonstrate the commercialization of solar energy.

THE QUEST FOR ENERGY INDEPENDENCE

The Project Independence proposed by President Nixon and implemented to a degree in the Ford administration took on many of the trappings of a comprehensive national energy planning effort. An elaborate computer model of the Nation's energy use was constructed and various policy alternatives were considered in terms of their effects upon the model. The model and the many volumes of publications which went with it were used to identify sets of policy options which, when appropriate choices were made, were supposed to lead the United States toward independence from foreign energy sources.

Like much of the work which went into it, the model was quite sophisticated and proved useful in evaluating some policy options. As an attempt to develop a blueprint for the future, however, Project Independence was a flop, largely because Congress refused to ratify some of the key steps sought by the administration, such as decontrol of oil prices. During the years while Project Independence was in vogue, American dependence on foreign energy sources increased steadily. Other trends which were sought as goals of the effort, such as increased coal production, also went in reverse, partly due to controls on oil prices and partly because of environmental and health and safety regulations.

Major legislation of the Project Independence era included the Energy Policy and Conservation Act, which was designed to encourage domestic production of energy; provide a strategic oil storage reserve; provide a level of oil prices which would both encourage production and not impede economic recovery; and reduce energy consumption through voluntary and mandatory energy conservation measures. The act, which was signed by President Ford in December of 1975, was a fairly comprehensive piece of legislation. It dictated fuel efficiency of automobiles to be manufactured or imported after 1977 and required FEA to set efficiency targets for appliances and to test and label such appliances. It also authorized $150 million to assist states in developing and carrying out energy conservation programs to reduce energy consumption by five percent below the level otherwise projected for 1980. In order to qualify for these grants a state had to impose thermal and lighting efficiency standards on buildings and allow vehicles to make right turns after a stop at a red traffic light. In 1975 Congress rejected a program of loan guarantees to aid development of synthetic fuels from coal.

ENERGY PROBLEMS BECOME LESS VISIBLE

By 1976 the shock of the crisis following the embargo had subsided and congressional efforts to address the continuing, but less visible, energy problems slowed down. The major bill to be enacted was the Energy Conservation and Production Act. This act extended the life of the Federal Energy Administration and authorized continued funding of its activities. It provided for decontrol of minor sources of oil and some petroleum products and authorized FEA to make grants to states for weatherization of low income homes. The Department of Housing and Urban Development was required to develop building energy performance standards which would ensure that every new building constructed (except private homes) would meet these standards. It also provided supplemental funds to state energy offices for the conduct of energy conservation activities such as energy audits of buildings and efforts to increase public awareness of the problem.

In other action the Senate killed efforts by the nuclear industry to open the uranium enrichment industry to private enterprise. Despite support from both business and labor interests, the House rejected federal loan guarantees and price supports for synthetic fuels. President Ford did not get the decontrol of oil prices which he sought.

A COLD WINTER CAUSES A SHORTAGE OF NATURAL GAS

The winter of 1976-77 was unusually cold, causing supplies of natural gas to fall to such low levels that service to some customers was curtailed. By the beginning of February, eleven states were in an emergency status with industries and schools closed due to lack of gas. The newly elected President worked with Congress to quickly enact the first energy measure of 1977. The Natural Gas Act of 1977 gave the President authority to transfer interstate natural gas supplies to areas experiencing severe shortages. It also allowed him to approve sales of gas to interstate buyers at unregulated prices. This was an emergency bill which expired within the year. Another problem of that period was that some sections of the Nation experienced blackouts as demand for electricity exceeded generating capacity. The experiences of that winter renewed the call for a comprehensive national energy policy.

In 1977 President Carter said, in a message to Congress: "Nowhere is the need for reorganization and consolidation greater than in energy policy. All but two of the executive branch's cabinet departments now have some responsibility for energy policy, but no agency...has the broad authority needed to deal with our energy problems in a comprehensive way." Carter's proposed Department of Energy called for consolidation of the Federal Energy Administration, the Federal Power Commission, and the Energy Research and Development Administration in their entireties. Specific energy functions from several other departments and agencies were also marked for transfer to the new department. Five months later he signed a bill creating the Department of Energy.

Energy policy had high visibility during the first year of the Carter administration. In April of 1977, the President announced his National Energy plan. Its main objectives were to cut the Nation's consumption of oil and natural gas and to use available energy more efficiently. After eighteen months of debate, a greatly altered package emerged from Congress and was signed by the President in November 1978.

President Carter invoked the first veto of his administration on November 5, 1977, rejecting an energy research funding bill because it contained funding for the Clinch River Reactor. This project was intended to demonstrate the feasibility of electrical generation by a plutonium producing "breeder" reactor. The President objected to this technology on the grounds that the availability of plutonium could lead to the proliferation of nuclear weapons.

The National Energy Extension Service Act was passed in June 1977. This bill authorized funding to state energy offices to assist small scale energy users by providing information on conservation and conversion to renewable energy sources.

THE NATIONAL ENERGY ACT

The major energy-related legislative activity of 1978 was the passage of the National Energy Act of 1978. This was a

highly modified version of the administration's energy program as proposed the previous year. This package contained the following five parts:

1. The National Energy Conservation and Policy Act authorized matching grants totaling $900 million to schools, hospitals, and local governments to pay for 50 percent of the cost of technical assistance and in the case of schools and hospitals, actual purchase and installation of energy conservation measures. It also required large utilities to provide a Residential Conservation Service (RCS) to their customers.

2. The Power Plant and Industrial Fuel Use Act required new industrial or utility plants using oil or gas were to switch to other fuels by 1990. President Carter had proposed a stiff tax on industrial use of oil and gas to spur conversion to coal, but Congress dropped that provision.

3. The Public Utilities Regulatory Policies Act (PURPA) required state utility commissions to consider rate structures which would reduce consumption at peak periods. Initially mandatory guidelines had been proposed, but Congress argued that the states should continue to oversee their utilities and rejected creation of federal guidelines. This bill also encouraged development of small scale hydro power projects.

4. The Energy Tax Act provided homeowners and businesses with tax credits for installing energy-saving devices in their buildings. A ten percent investment credit was made available for businesses that installed specific types of energy conservation equipment. Starting with the 1980 model year, cars referred to as "gas guzzlers" would be taxed.

5. The Natural Gas Policy Act allowed the price of newly discovered gas to rise about 10 percent a year until 1985, when price controls would be lifted. For the first time some federal controls were imposed on the price of gas produced and sold within the same state.

In 1978, Congress approved a decade-long program to accelerate the development of photovoltaic cells, which convert sunlight directly into electricity. This measure authorized $125 million in 1979 for this effort. In other action, a bill to facilitate the building of coal-slurry pipelines was defeated after intense opposition by the Nation's railroads, but a bill to reform offshore oil and gas leasing laws was enacted.

THE IRANIAN CRISIS CREATES RENEWED CONCERN

Under the Shah, Iran had rivaled Saudia Arabia as OPEC's largest producer of petroleum. Prior to the revolution in early 1979, Iran's government, although a member of OPEC, had been friendly to the United States. The revolution cut Iran's oil production to one fifth of what it had previously been, and the eventual recovery has not yet brought production back to half its earlier maximum of over six million barrels a day.

The interruption of oil from Iran and the reappearance of waiting lines at gas pumps in many cities called renewed attention to the dependency of the United States upon imports. The recession following the 1973 embargo had kept imports from growing during the first few years after quotas were removed. With improvement of our economy, however, imports had soared, increasing by about 45 percent from 1975 to 1977. They reached their highest level at an average of 8.8 million barrels per day or 48 percent of our oil needs, in 1977. The opening of the Alaska pipeline somewhat reduced the need for foreign oil in early 1978, but imports began to rise again until the interruption of oil from Iran early in 1979. Despite years of efforts to remove dependency upon foreign oil, the actual trend had been just the reverse. In addition, in early July of 1979 the OPEC ministers had voted to raise the price of a barrel of crude oil by 24 percent, this being the largest single increase in the price of foreign oil since the fourfold increase which accompanied the 1973 embargo. However, OPEC's prices were now simply ratifying the rising price of

oil on the world market, driven upward by reduced Iranian production and panic buying.

In response to this situation, President Carter announced on July 15, 1979 that he would reimpose import quotas. The United States, as part of an agreement with six other major industrial nations (France, Britain, Canada, Japan, West Germany, and Italy) pledged to hold its imports to 8.5 million barrels a day through 1985.

The President's strategy, like that of previous administrations, was to encourage domestic production of oil and promote conservation by full decontrol of oil prices. However, Congress, alarmed by the enormous profits already being reported by oil companies, rejected the President's proposal for full decontrol, but continued to entertain his request for a windfall profits tax. This proposed tax would capture and use for public benefit, some of the record high profits that oil companies would reap as decontrolled domestic oil rose to the rapidly escalating world oil price, under the existing schedule for decontrol.

Congress gave approval to a standby plan allowing the President to limit the temperatures permitted and thus the energy consumption in public buildings. On July 16, 1979 the President invoked this authority to impose the Emergency Building Temperature Restrictions, which required that thermostats be set no lower than 78 degrees in summer and no higher than 65 degrees in winter. The administration hoped that this measure would reduce oil consumption by as much as two percent. Later, President Carter, by executive order extended these mandatory temperature restrictions on nonresidential buildings. However, in February 1981 this order was rescinded by President Reagan.

Efforts in Congress to expedite licensing of nuclear reactors, resolve the problem of spent fuel and determine the future of the breeder reactor were preempted by the accident at Three Mile Island on March 28, 1979. Questions of safety dominated discussions of nuclear power thereafter.

In November of 1979, the President signed the Emergency Energy Conservation Act. This standby plan gave the federal government great power to intervene in the event of an anticipated supply interruption. It required each state to develop a plan which would restrain demand for fuels to a degree sufficient to meet targets set by the President. Work on these plans was still in its infancy when President Reagan took office.

The two major energy bills enacted in 1980 were the Crude Oil Windfall Profit Tax Act and the Energy Security Act. A third element in President Carter's plan, the energy mobilization board (to cut federal red tape on energy projects) was rejected. In spirit, the windfall profit tax was designed to divert some earnings from the oil companies to cover energy conservation and solar tax credits, assistance to low income families and the synthetic fuels corporation. This bill was passed just after oil companies had reported earnings which showed annual increases of over 100 percent. Such profits had reinforced the belief of many consumers that they were being victimized for the benefit of the oil companies. This tax was projected to produce more than $227 billion in tax revenues for the decade of the 1980's.

THE ENERGY SECURITY ACT

The Energy Security Act was the crowning achievement for those who advocated a "Manhattan Project" approach to national energy self sufficiency. This act contained eight titles, the first of which authorized creation of the United States Synthetic Fuels Corporation, to be funded largely ($83 billion over the decade) by receipts from the windfall profits tax. The goal would be the production of 2.5 million barrels a day in substitute fuels by 1990. This would correspond to roughly 25 percent of our peak level of imports in 1978. The remaining titles provided funding and directives to encourage the production of alcohol fuels, the conversion of urban waste to energy, additional conservation programs and the creation of a Solar Energy and Conservation Bank within the Department of Housing and Urban Development. Additional provisions included financial assistance for feasibility studies on geothermal energy, funding for studies on the questions of acid rain and the effect of accumulation of carbon dioxide in the atmosphere. The final provision required that the filling of the Strategic Petroleum Reserve be accelerated.

By 1980, conservation efforts, encouraged by higher fuel prices, seemed to be having an effect on oil imports. For the first six months of 1980 imports were

down 13 percent, compared to the same period in 1979; this was an average decrease of over one million barrels a day. Throughout 1981 and 1982 imports continued to decline, but unfortunately this was largely attributable to the onset of a recession.

PRESIDENT REAGAN BRINGS A NEW APPROACH

The Reagan administration, with its faith in market forces and pledge to reduce the financial burden of government, took a different view of the energy problem. As put forth in the National Energy Plan III (a biennial report required of the President under the Act which established the Department of Energy), the administration stated that energy problems should be solved in the free market. The report favored full decontrol of fuel prices and opposed efforts to push conservation via mandatory efficiency standards. It also said that reducing oil imports at all costs should not be a major objective of national policy. The Reagan administration also favored the opening of wilderness areas for energy exploration.

President Reagan fully decontrolled oil prices but did not further decontrol prices of natural gas. The initial efforts of his administration to abrogate those existing energy programs to which it objected has generally been budgetary rather than through legislative amendments. As a result, many of the programs already in place have received reduced funding. The Solar Energy and Conservation Bank has been funded only as a result of legal action by advocates of solar energy.

The Reagan administration has continued to pursue its campaign pledge to abolish the Department of Energy, which it sees as a symbol of excessive government involvement in energy markets. The Department's staff and powers have been reduced, but so far the Administration has not found the support required to eliminate it.

The President has indicated his determination to rely on market forces to control a sudden shortage of energy. The price rise for fuels which would occur in such an emergency would be used to compel reduced consumption. Part of that price rise would be captured in taxes and returned to individuals with low incomes. Oil from the strategic petroleum reserve would be auctioned off to temper market reaction to the shortage.

In foreign policy, the President first opposed the construction of a natural gas pipeline from the Soviet Union to customers in Western Europe. The opposition took the form of sanctions against domestic manufacturers of components to be used in that system. However, as work progressed on this pipeline, these bans were lifted in response to the objections of our European allies.

The President's Nuclear Policy Statement of October 8, 1981 called for efforts to improve nuclear regulatory and licensing procedures and to demonstrate breeder reactor technology by completion of the Clinch River Breeder Reactor. This program was eventually terminated. In addition, he pledged to resolve the question of nuclear waste management and to permit reprocessing of spent fuel.

The President championed the nickel-a-gallon tax on motor fuels to raise revenue for much needed highway repairs and to support mass-transit systems.

OBSERVATIONS

Policy makers were concerned over reports of declining domestic oil and gas resources and dependence on foreign oil before the 1973 embargo. In December of 1971, the Trustees of the Ford Foundation authorized the Energy Policy Project. This project's final report, entitled "A Time to Choose," was published in 1974. Despite the diversity of perspectives which went into this study, there was agreement on the following points:

> "There is an energy crisis. It did not come and go in 1973-74. It will last a long time. Conservation is as important as supply. We do need 'an integrated national policy.'"

This report served as a major source of information and exerted an influence on subsequent energy policy. This report, and many others issued by those concerned with energy matters, have called for a national energy policy. Two presidents made intense efforts to achieve enactment of comprehensive energy programs. Each only partially succeeded in this endeavor. The outcome, after lengthy debate on virtually every point, was, of course, one of compromise. The history of the past decade suggests that virtually every

mechanism of our governmental process has been exercised in pursuit of energy policy or in an effort to influence it.

Today, the larger issue seems to be the Nation's economy; thus, the Reagan administration's energy policy is largely a consequence of its approach to solving the Nation's economic ills.

It is now generally agreed that federal regulation of the petroleum industry contributed to the decline of domestic oil production and the growth of dependence on foreign oil. Increase in price of oil, as a reflection of scarcity, has traditionally led to increased drilling. When price signals to the oil industry or to the consumer were blunted, proper responses were inhibited.

One of the most serious consequences of our suppressed energy prices was the effect which this had on the consumer. Over those years during which energy was a minor expense, America made its choice of transportation system, building stock, manufacturing processes and lifestyle. Unfortunately, in the light of today's energy prices, much of what has been built has a long lifetime.

Most of our existing building stock, for example, 80 percent of which will still be in use at the end of this century, was not built with today's energy costs in mind. Nevertheless, consumers and organizational decision makers are now responding to the realization that energy costs constitute a significantly increasing portion of their budgets. Lifestyles have changed, investment in making buildings energy efficient can be easily justified and the American car buyer has rejected the gas guzzler, not because of federal regulations, but because of the rising cost of energy (although it may be argued that federal programs have assisted by compelling automobile manufacturers to improve the efficiency of their product and by providing the consumer with objective information on opportunities to conserve energy).

We live in a nation largely designed to run on cheap energy, and it will take time and a large monetary investment to alter our system to reflect significantly higher energy costs. It is critical to remember that price increases for conventional fuels, and not governmental intervention, should ultimately make conservation and the use of renewable resources and emerging technologies attractive by justifying the necessary investment.

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OIL AND GAS NEWS

Drilling off the Virginia coast may begin in either March or July of this year. Shell Oil Company has been given approval by the Department of Interior to begin working on two spots east of Chincoteague Island in water depths of about one mile.

Recent rules and regulations have been established by Virginia Oil and Gas Conservation Commission regarding drilling for oil in Lee County. All wells drilled for crude oil down to the Mid-Ordovician unconformity or the Dot Limestone must be at least 1000 feet from the nearest existing or proposed well, in such cases, drilling units are to contain about 20 acres. For wells drilled in Lee County below the Mid-Ordovician unconformity, the commission set minimum spacings at 1,320 feet and stipulated that drilling units contain 30 acres.

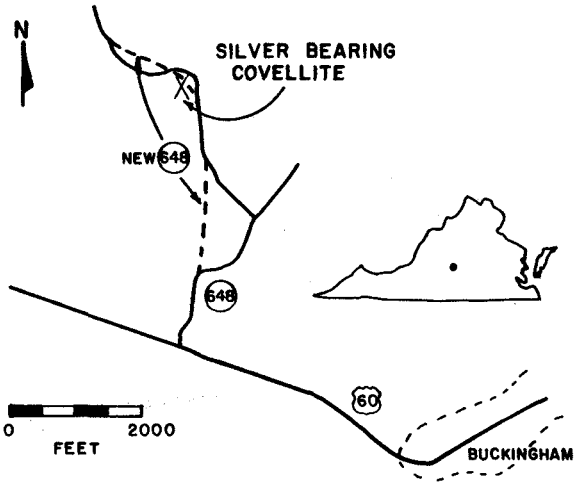

Figure 1. Location map for silver-bearing covellite occurrence, Buckingham County, Virginia.

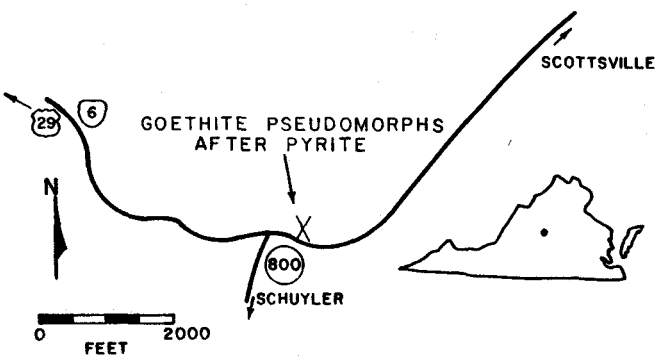

Figure 2. Location map for goethite pseudomorphs after pyrite, Albemarle County, Virginia.

MINERAL UPDATE

Wm. F. Giannini

Covellite (copper sulfide) containing silver was recently discovered by the author in central Buckingham County. In addition the finest crystal specimens noted from Virginia of goethite pseudomorphs after pyrite (hydrogen iron oxide) were found in a schist in southwestern Albemarle County (figures 1 and 2).

Covellite, previously unreported in the literature about Buckingham County, occurs in a massive quartz vein cut during construction improvements to State Route 648. Ern's 1968 geologic map of the Buckingham quadrangle indicates the quartz vein as a prospected body along the contact zone between the Mt. Rush metagabbro and the Candler Formation, both of Paleozoic age. Covellite can be an ore of copper and silver if it is found in commercial quantities. Fire assay of the covellite and quartz indicate 0.05 ounce of silver per ton of ore. Chalcopyrite and pyrite also occur in the quartz vein.

Excellent crystals of goethite pseudomorphs after pyrite were recently collected from an excavated bank approximately twenty

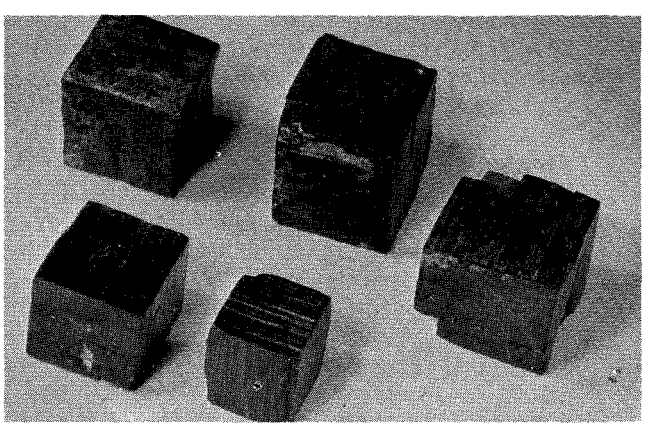

Figure 3. Magnificent sharp and shiny crystals of goethite pseudomorphs after pyrite from a new location in Albemarle County, Virginia. (Photo by T. M. Gathright, II). Largest pseudomorph is one inch across.

feet north of a grocery store on Route 6, Albemarle County (Figure 3). Commonly known as "devils dice" the crystals are to one inch across and occur in a schist member of the Precambrian Charlottesville Formation (Nelson, 1962). They are of interest to scientists and collectors.

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OIL AND GAS SEMINAR

Fred S. Honkala

A seminar that dealt with developments in oil and gas in Virginia during 1982 to 1983 was held on October 26. The seminar, sponsored by the Virginia Division of Mineral Resources (VDMR) and the Virginia Oil and Gas Association, was held on the Virginia Polytechnic Institute and State University (VPI&SU) campus in Blacksburg, Virginia. Approximately 100 people interested and/or involved in Virginia oil and gas registered. The seminar was called to order at 8:30 a.m. in the Donaldson Brown Center for Continuing Education at VPI&SU by Dr. Philip L. Hall, Assistant Provost of VPI&SU. Dr. Hall welcomed the seminar participants and spent a few minutes describing the fine geology department at VPI&SU.

Dr. R. C. Milici, State Geologist for Virginia reviewed oil- and gas-related projects being carried on by the Division of Mineral Resources on such subjects as Paleozoic stratigraphy and regional/areal structural trends. Dr. Milici presided at the seminar for the rest of the morning. The next speaker on the morning program was State Oil and Gas Inspector, B. T. Fulmer of the Virginia Division of Mines and Quarries. Fulmer reviewed the Virginia oil and gas picture for 1983 from his point of view as Inspector.

Eugene K. Rader, geologist, VDMR, followed with a paper entitled "Valley and Ridge Stratigraphy and Hydrocarbon Exploration", in which he reviewed Cambrian, Ordovician, Devonian, and Carboniferous oil-bearing strata in southwestern Virginia.

Kenneth Englund, geologist, USGS, emphasized the Carboniferous oil-gas oil-bearing strata in southwestern Virginia.

Charles Stanley and Art Schultz, geologists, VDMR, reported on methane availability from coal-beds in the Blacksburg, Virginia region where VDMR had drilled test holes to coal beds to determine how much methane there was in the coal. (See VDMR Publication 46, 1983 for data on coal-methane drilling project.)

After the luncheon the seminar was presided over by Ms. Joan Polzin, geologist, VDMR; the afternoon's first paper was presented by Dr. Ralph L. Miller, geologist, USGS in which he reviewed the development of the Rose Hill and Ben Hur oil fields, these two being the largest of the few small fields located in southwestern Virginia.

Tom Gathright, geologist, VDMR, presented the next paper, on the topic of "Lineament and Fracture Trace Analysis and its Application to Oil Exploration in Lee County, Virginia; an update". Gathright showed lineament patterns in the structure of southwestern Virginia and how they relate to the localization of oil therein.

S. Magnus Bergman, president of the Itaska Consulting Group of Kansas City, then gave a paper on possible oil and gas storage in old Virginia salt and limestone mines.

With Harry Webb, geologist, VDMR presiding, Gordon Grender, geologist, VPI&SU was the next speaker and he spoke on oil field size distribution.

The closing paper was presented by Dr. Walter R. Hibbard, VPI&SU, University Distinguished Professor of Engineering, who spoke on current use of oil vs. gas by industry. He also summarized the program of the seminar.

INDUSTRIAL WASTE CONFERENCE

CALL FOR PAPERS. 16th Mid-Atlantic Industrial Waste Conference, June 24- 26, 1984, Penn State University, University Park, Pennsylvania. Theme: Focus on

Problem Solving. Abstracts are solicited for papers on all areas of industrial waste treatment with particular emphasis on papers dealing with Hazardous Waste Management. Topic areas include: Industrial Residues, New Treatment Processes, Resource Recovery, Remedial Actions, Toxic and Hazardous Materials, Analytical Procedures, Pretreatment, Socio-Economic Issues, Public Relations and Participation. Prospective authors should submit six copies of a 500 to 1000 word abstract by December 20, 1983, to: David A. Long, Penn State University, 212 Sackett Building, University Park, Pennsylvania, 16802. The abstract should provide sufficient information on the salient features to permit a knowledgeable committee to determine the appropriateness of your presentation. Abstracts will be judged on the basis of: (1) industrial waste significance, (2) technical content, (3) abstract preparation. Authors selected for the program will be requested to prepare complete manuscrips by April 1, 1983 for inclusion in the conference proceedings published by Ann Arbor Science.

SYMPOSIUM ON VIRGINIA QUATERNARY

On the occasion of the 150th anniversary of its founding, the Virginia Division of Mineral Resources is sponsoring a symposium on the Quaternary of Virginia and nearby areas, in Charlottesville, September 26-28, 1984. The technical sessions will be followed by a field trip on September 29 to vertebrate fossil sites at Saltville in southwestern Virginia.

On the evening of September 26 and on the 27th, invited speakers will discuss the region's ancient plant and vertebrate communities, megafaunal extinctions, archaeology, upland geomorphology, and Quaternary zoogeography. The larger fossil vertebrates will be emphasized to commemorate Thomas Jefferson's interest in them. One-half of September 28 will be used for poster papers. Authors who wish to contribute a poster paper on topics relating to those outlined above should submit titles no later than August 1, 1984.

For further information on the program and for registration forms write to S. O. Bird, Virginia Division of Mineral Resources, P. O. Box 3667, Charlottesville, Virginia 22903; phone: (804) 293-5121.

VIRGINIA DIVISION OF MINERAL RESOURCES SESQUICENTENNIAL CELEBRATION

The 150th birthday of the Virginia Division of Mineral Resources will be celebrated by a series of events beginning in May of 1984 and continuing through November, 1985. The Division (formerly the Virginia Geological Survey) was established in 1835 by William Barton Rogers who was also the first state geologist.

The Virginia Academy of Science meeting, to be held in Richmond in May of 1984, marks the kick-off for the sesquicentennial activities. This and subsequent events are listed below. Precise dates for some of the events will be announced later.

1. Virginia Academy of Science - University of Richmond - May 15-18, 1984. Mineral Resources of Virginia.
2. Vertebrate Symposium - Charlottesville, Virginia - Sept. 26-29, 1984 (field trip to Saltville included).
3. 16th Annual Virginia Geological Field Conference, to originate in Lexington, Virginia - Oct. 1984 Valley and Ridge structure and stratigraphy.
4. Shenandoah Gem and Mineral Show, Waynesboro, Virginia - Oct. 1985.
5. Tentative - 17th Annual Virginia Geological Field Conference - Oct. 1985. Geology of Giles County.
6. American Association of Petroleum Geologists - Williamsburg, Virginia - Nov. 10-12, 1985.

OFFSHORE GEOLOGIC STUDIES

The Department of the Interior's Minerals Management Service announced a cooperative agreement with the Bureau of Economic Geology of the University of Texas at Austin involving offshore geologic studies of 17 States.

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[1]One MMBTU is the amount of heat required to raise the temperature of approximately 120,000 gallons of water one degree Fahrenheit.

[2]Average gasoline is the weighted average sales price for all types of gasoline in the U.S.

[3]These figures do not take into consideration the efficiency of fuel-consuming devices; for example, a heat pump vs. electrically radiated heat or a tuned engine vs. an untuned engine.

Source: Society of Petroleum Engineers; American Institute of Mining, Metallurgical, and Petroleum Engineers, 1983, TIC fact sheet and Department of Energy Monthly Energy Review.